trustworthy guide. Hooker's maps have helped in settling boundary disputes and in conducting military operations.

Artists or climbers who have followed Hooker's path have rarely described their tours; there was little to tell that Hooker had not already told. Scientific travellers have deviated as much as possible from Hooker's track; their writings record facts already noted by Hooker; they less often allude to places he visited.

Among wanderers in Sikkim who have felt the spell of the region and the charm of Hooker's style is Lt.-Col. W. J. Buchanan, C.I.E., who has, in "Bengal Past and Present" (Calcutta Historical Society, vol. xiv.), taken us "In the Footsteps of Hooker through Sikkim and Nepal." The intrinsic value of this interesting article is enhanced by the testimony it bears to the accuracy of Hooker's observations and the soundness of Hooker's conclusions. It forms a fitting and graceful centenary memorial of the great traveller and naturalist.

Besides minor excursions, Hooker made two great Sikkim journeys. During the first—October, 1848, to January, 1849—he explored the upper catchment area of the Rangiet, in western Sikkim, and penetrated some way into eastern Nepal. The second journey—May to December, 1849—took him to the valleys of north-eastern Sikkim, drained by the Lachen and the Lachung, which unite to form the Tista. Wide as Hooker's interests were, he was primarily a botanist, and singularly few of the floral features of the land escaped his eye, especially during the second journey, one episode of which was his capture and imprisonment, along with the Political Officer, Dr. Campbell, by the Rajah of Sikkim.

Much, however, was still left to do. Hooker's friend and fellow-student, T. Thomson, who joined him at Darjeeling, and explored the Khasia Hills along with him in 1850, ultimately succeeded H. Falconer as superintendent of the Royal Botanic Garden, Calcutta, and continued the botanical investigation of Sikkim. T. Anderson, superintendent from 1858 to 1870, did the same.

Hooker, in his "Journals," describes the efforts made to prevent his reaching the Tibetan border. To the energy and tact of Sir G. King, superintendent of the Calcutta Garden from 1871 to 1898, we owe more than the systematic investigation of valleys and passes not visited by Hooker. Though political difficulties prevented King from supplementing Hooker's Nepalese results, he was able to explore the district of Chumbi, which, though politically Tibetan, is geographically Himalayan, as thoroughly as he did Sikkim. Among those whose share in the botanical survey of Sikkim during this period deserves especial mention were W. T. Blanford, C. B. Clarke, H. A. Cummins, D. D. Cunningham, Sir J. Ware Edgar, J. S. Gamble, G. A. Gammie, H. C. Levinge, J. L. Lister, R. Pantling, and Sir G. Watt.

One district, Lonakh, in northern Sikkim, behind the Kinchinjanga *massif*, still remained unexplored. Objection was not taken in 1849 to Hooker's attempt to enter this district, but his party was unable to cut a path through the dense rhododendron forest of the upper Zemu, which blocked the way. Political difficulties frustrated King's wish to explore Lonakh, the "great black south" of the Tibetan graziers, who drive their yaks to its poor alpine summer pastures. An expedition organised by him for the purpose in 1892, under Mr. G. A. Gammie, had at the last moment to be diverted to another district.

This region, difficult of access from the south, was at last traversed by Mr. Freshfield, whose account of his journey, "Around Kanchenjunga," published in 1903, now almost takes the place of Hooker's "Journals." The first Lonakh plants to reach the Calcutta herbarium were sent from the Naku-la by Sir F. Younghusband in 1903. It has been the good fortune of the present superintendent of the Calcutta Garden, Lt.-Col. A. T. Gage, to organise an expedition, led by Messrs. W. W. Smith and G. H. Cave, which in 1909, by investigating this district, has done much towards completing the botanical survey of Sikkim begun by Hooker.

NOTES.

That "prevention is better than cure" needs no argument, and yet it may be observed from time to time in the daily papers that the general idea of a Ministry of Public Health seems to be that the various organisations for *treatment* of disease are very specifically involved, and that, provided the interests of these organisations are secured, all might go well. It is only Lord Rhondda who appears to place *prevention* well to the front. Insurance against sickness is necessary where prevention fails, but surely every bed occupied by a sick man or woman is a possible censure upon the prevention side. There are, therefore, two distinct branches of work. Prevention involves the organisation of science, not merely laboratory science, but also the practical applications of the lessons learned in the laboratory, these applications being carried out by scientifically trained men. Treatment involves the reconstruction of our hospital system. If we are to have a Health Ministry and a really national Health Service it is the prevention side that demands, and must receive, the chief attention of our statesmen. For the cure of disease we may justly be proud of our doctors of all ranks. But what is their work? Nine-tenths of it is trying to remedy and cure easily preventable disease. King Edward asked: "If preventable, why not prevented?" and his question has not yet been answered. If the Health Ministry is to be a success its chief aim must be prevention. We who believe in the urgent necessity for a Ministry of Health want to answer King Edward's question, and so to deal with the health of the nation that the next generation will know nothing of preventable disease, or, if it occurs, will regard it as a disgrace, and that the sufferer from any disease the cause of which is known and preventable will be as ashamed to admit it as is now the case with those affections which are known to be the result of excesses and loose living.

For several years before the war various branches of science had gradually been acquiring the elements of an international organisation, and in several instances Germany had secured that the central bureaux should be associated with her own national institutions dealing with the branches of science concerned. These arrangements have lapsed since the outbreak of war, either informally, or, as in the case of the International Geodetic Association, by the non-renewal of the diplomatic convention which had constituted and maintained the association. The convention was originally concluded in 1895, and renewed in 1907 for a further period of ten years, so that it ceased to exist last year. In the course of 1916, however, steps were taken by a group of neutral States—Switzerland, Holland, Denmark, Sweden, Norway, Spain, and the United States of America—to constitute amongst themselves, and under terms resembling those of the old convention, a small association which might maintain the work of the wider body, if only in a restricted form; this neutral group is to dissolve two years after the conclusion of peace. Among other services, it has assured the continuance of the international scheme for determining the variation of latitude. The question of the future of international geodetic work has recently been raised, perhaps a little prematurely, by M. Ch. Lallemand, Directeur du Service du Nivellement de la France. In a letter addressed to the delegates from all the countries of the Entente to the lapsed association, and also published in the *Revue générale des Sciences* (February 28, *Supp.*, p. 17), M. Lallemand advocates the foundation of a new body, to be confined, at least initially, to the Entente countries. With this in view he has sent out a draft of a proposed convention, which, amongst its provisions, departs from former practice in giving voting power to the different countries, not equally, but in some kind of proportion to their relative importance. A special conference will be called to discuss the proposals as soon as occasion offers.

From time to time the safety of the numerous prehistoric remains on Salisbury Plain has been a matter of anxious concern to antiquaries in consequence of the use of the Plain by the military authorities. There has been every evidence of goodwill on the part of the military authorities, but their best intentions and endeavours have not been sufficient to prevent a considerable amount of mischief being done. A valuable step in advance has recently been taken at the instance of the Society of Antiquaries by the appointment of Lt.-Col. William Hawley, of Salisbury, the able explorer of Old Sarum, as an inspector to watch over the safety of these remains and report to the War Office any injury with which they may be threatened. It is to be hoped that his authority may be extended in the direction of empowering him to take effectual steps to prevent any such injury. The safety of Stonehenge itself is not so well assured as could be wished. Since it was acquired by a public-spirited citizen of Salisbury it has been placed in the charge of a custodian employed by him, and watched over by a police constable, and for their accommodation two cottages had been provided in the immediate neighbourhood of the monument. For some military reason which has not been disclosed, the authorities have taken over these cottages and ordered them to be demolished. As there are no other cottages in the neighbourhood, the necessary consequence seems to be that the custodian and constable cannot exercise constant supervision as hitherto. The Society of Antiquaries has adopted the following resolution, drawn up by its president, Sir Arthur Evans:—"The Society of Antiquaries has heard with concern that the War Office proposes to demolish the two cottages by Stonehenge, which serve as the domiciles of the custodian and the police constable charged with the safe-keeping of the monument. As these are the only available cottages in the neighbourhood the society feels that such action may be fraught with perilous consequences, and therefore begs leave to direct the attention of the Secretary of State for War to the urgent necessity of taking adequate steps to protect this national monument from injury or defacement."

The *Times* of March 28 publishes a long Reuter message from Stockholm containing parts of the memorandum on the crisis which led to war drawn up in August, 1916, by the former German Ambassador in London, Prince Lichnowsky. The memorandum decisively fastens upon Germany the responsibility for the war, and is a document of high historical importance, especially if the whole of it represents the British attitude so truthfully as is done by Prince Lichnowsky in the following reference to what is thought of science and learning:—"In no place . . . is an envoy's social circle of greater consequence than in England. A hospitable house with friendly guests is worth more than the profoundest scientific knowledge, and a learned man of insignificant appearance and too small means would, in spite of all his learning, acquire no influence. The Briton hates a bore and a pedant. He loves a good fellow."

Mr. H. J Helm, whose death occurred last week at Bromley, Kent, was for several years deputy-principal chemist of the Government Laboratory, which position he held on his retirement from the public service in 1904. For a considerable period previously Mr. Helm had been a superintending analyst in charge of chemical matters connected with the assessment of revenue, and his technical knowledge of the brewing, distilling, and tobacco-making industries, as also of the legal enactments by which the operations of these industries are controlled, enabled him to render valuable assistance in matters of fiscal chemistry to Sir Edward Thorpe when the latter succeeded the late Dr. Jas. Bell as head of the laboratory. Cautious and shrewd, Mr. Helm had a marked sense of what was reasonably workable in applying laboratory results to industrial practice, and his advice tended always to assist in holding the balance fairly between the interests of the Exchequer on one side and those of the manufacturing and general public on the other. He was of somewhat reserved, but withal kindly, disposition, and the news of his decease, albeit at the ripe age of seventy-nine, will be heard with regret by many friends and official acquaintances.

The special correspondent of the *Times* at the War Correspondents' Headquarters in France says that information as to the long-range guns which are shelling Paris was obtained last December from prisoners. The guns were said to be of 15 in., and fined down to about 8¼ in. They were, according to one informant, 79 ft. long, and in the trials had carried 75 kilomètres, and were expected to carry 100 kilometres, or 62 miles. More remarkable than the gun was the shell, which was 59 in. in length and prolonged into a bottle neck at the front, with two copper driving bands and rifling extending in advance of these, the weight of the shell being about 350 lb. The two copper driving bands are 1 in. wide, and in front of these is a steel or iron band of 3 in. or more, over which the rifling extends, which would give the shell great stability in the air. According to the latest information derived from prisoners, the *Times* correspondent says, the gun's length would probably be about 104 calibres—that is, 104 times the diameter of the bore—which is getting on for twice the length of any gun of the same calibre we make. The muzzle velocity is estimated to be from 4500 to 5000 ft. per second, and it is conjectured that the gun is elevated to an angle perhaps as high as 55°, so that the main part of the path of the shell would be in a region where little air resistance would be experienced.

We regret to see the announcement of the death of Mr. G. M. Seabroke, director of the Temple Observatory, Rugby.

The annual oration of the Medical Society of London will be delivered by Dr. T. S. Hyslop on May 13, upon the subject of "Degeneration in Art, Science, and Medicine."

We learn from the *Times* that at the annual meeting of the Association of Chambers of Commerce to be held in London on Tuesday and Wednesday next a Bill for providing a decimal system of coinage will be submitted for approval. The terms of the Bill have been agreed on by the Executive Council of the association, the Bankers' Institute, and the Decimal Association. Arrangements are being made for its immediate introduction in the House of Lords.

In the *Museum Journal* (vol. viii., No. 2, June, 1917) there is a remarkable account of human sacrifice among the Mundurucu Indians on the Tapajos River, a tributary of the Amazon. Disease is believed to be caused by a Bokaidpot, or evil genius, in the village. This person is identified by the medicine man, and he is slain if many deaths or much sickness occur. The victim is strangled by means of a cord pulled tightly round his neck, and next morning, after the chief has seen it, the body is cremated. The accused knows he is to be killed and offers little resistance. Two men are appointed to do the deed at the first opportunity; they may select their time, but cannot escape the duty.

Mr. T. Sheppard, in the *Naturalist* for February, describes a collection of implements of the Bronze age in the Whitby Museum. There are in all twelve specimens, of which two are evidently of Irish origin, and some are imperfect. One rare type of implement, a socketed dagger, is unfortunately imperfect, the blade being broken, and a crude attempt having been made to sharpen the broken part for use as a chisel. Two specimens are obviously forgeries, and seem to be rather clumsy attempts to imitate genuine weapons. These are clearly the work of "Flint Jack," who was a native of the Whitby district, and spent some time there in his later years doing his best to satisfy the demands of collectors.

The Hon. J. W. P. Murray, Lieutenant-Governor of Papua, has forwarded to Mr. S. H. Ray a vocabulary of the people between the Fly and Strickland Rivers, Papua, which is published in the March issue of *Man*. These people live about Lake Murray, a large, swampy tract which lies in the angle formed by the junction of the Fly and Strickland Rivers, discovered by Messrs. Massy-Baker and Burrows in 1913. The language of these people seems to be closely connected with that of the Merauke or Tugeri tribe, and the tribes connecting the races of these two areas must be sought in the still little-known interior of the island rather than along the coast. In one village stuffed heads, like those found on the Strickland, and described by D'Albertis, were noticed. But the latter was mistaken in believing that the skull was removed through a long cut on the neck; as a matter of fact, the flesh is replaced by clay or fibre; the skull is not removed.

The volume of Scientific Reports of the Agricultural Research Institute, Pusa, for 1916–17 continues the record of valuable services rendered to Indian agriculture by this institution. The report of the director is accompanied by the reports of the heads of the various scientific divisions, and the matters dealt with are so varied as to preclude any effective summary within the compass of a brief note. A few subjects chosen at random include starch production, soil aeration, wheat-breeding, indigo, paddy diseases, disease-carrying insects, and green manuring. Detailed reports on some of these subjects have been published during the year and noted in these columns.

A bacterial disease of wheat in the Punjab is described by Mr. C. M. Hutchinson in the Memoirs of the Department of Agriculture in India (vol. i., No. 7). In the affected wheat the inflorescence and parts of the stem are covered with a bright primrose-yellow slime, and the growth of the plant may be interfered with and the stem distorted. The appearances are well depicted in a coloured plate. The yellow slime is crowded with bacilli, which can be readily cultivated on a variety of culture media, yielding yellow growths on many. Inoculation of wheat plants with cultures successfully reproduced the disease provided that the plants were kept in an abnormally moist atmosphere. The bacterium is named *Pseudomonas tritici*.

Prophylactic inoculation against pneumococcal infections is the subject of a research by Mr. F. S. Lister (Publications of the South African Institute for Medical Research, No. x.). He shows that from 63 to 77 per cent. of all cases of pneumonia among the Transvaal native miners are caused by one or other of three races or groups of the pneumococcus designated A, B, and C. By prophylactic inoculation, pneumonia has been completely abolished on the Crown Mines. The method is to administer three subcutaneous inoculations of one cubic centimetre each of a vaccine containing representatives of the three groups, A, B, and C, of pneumococci in equal proportion, and containing seven thousand million cocci per c.c. Details are given for the preparation of the vaccine, and statistical data of the results obtained by its use are tabulated.

The cessation of the trade in tinned articles of food during the war has forced India to rely on its own resources. An exhibition of such local productions held at Calcutta early in January last shows how much progress has already been made. The sun-drying of vegetables has been undertaken; dried and made into bricks, the weekly supply for a thousand men on active service can be carried in twelve kerosene tins, an easy load for two mules. Biscuits are being largely made of the flour of Pusa wheat; macaroni, vermicelli, and ground rice are made. Hams and bacon come from the Balaclava farm at Ghoom, the produce being sold at little more than half the price of the imported article. Cured and tinned fish and a large selection of condiments are another branch which has proved very successful. The exhibition will do much to encourage this new trade in food for Europeans in India.

The migrations of the king-fish, or opah (*Lampris luna*), and of the sun-fish (*Orthagoriscus mola*) in British waters are briefly summarised in the *Scottish Naturalist* for February by Prof. D'Arcy Thompson. His analysis of recorded captures of the first-named, all of which were secured with a hook, seem to show that the northern movements of this fish lie in a sort of belt along the edge of the deep water from the eastern side of the North Sea round the Shetlands to the outer side of the Hebrides. This migration unmistakably attains its maximum during the summer months, though there are many records of specimens taken during winter. But these are all inshore records, suggesting that such individuals must be regarded as stragglers which have lost their way. The migrations of the sun-fish show a double maximum, one in early summer for our southern and western coasts, and one in autumn for the east and north. It has been suggested that the sun-fish is, so to speak, a passive migrant, carried along by ocean currents with no "proper motion" of its own. Prof. D'Arcy Thompson is by no means inclined to accept this view. Though he agrees that the great Atlantic "Gulf

Stream" current plays an important part in these movements, he is led to the conclusion that food is the influence immediately at work, these fish preying largely on eel larvæ or "leptocephalids," which, during the summer months, are making their shoreward migration from the Atlantic. "There would seem," he remarks, "to be a close and even precise correspondence between this periodic annual migration of the Leptocephali and the appearance of the sun-fish in our home waters."

Mr. E. E. Green, in the *Entomologist's Monthly Magazine* for March, makes a plea in favour of the introduction into Great Britain of two species of exotic butterflies. Mischief enough already has been wrought in many parts of the world by experiments of this kind, and it is devoutly to be hoped that further ventures in this direction will not be made without the fullest consideration of the possible consequences.

The structure and relationships of Bathynella, the European "well-shrimp," are discussed by Dr. W. T. Calman in a recent paper in the *Quarterly Journal of Microscopical Science* (vol. lxii., part 4, 1917). From the study of a few fresh specimens from Switzerland Dr. Calman definitely confirms his long-held opinion that this tiny, blind crustacean is a degenerate member of the Syncarida, where it finds its place together with Anaspides and the remarkable allied genera that inhabit certain Tasmanian and Australian lakes, and Palæocaris and other fossils preserved in rocks of the Palæozoic era.

The advance of our knowledge about the part played by blood-sucking insects in the spread of disease is of such importance and so continuous that the paper by M. E. MacGregor (*Bull. Entom. Res.*, vol. viii., part 2, 1917), giving a summary of the recorded "Insect Vectors of Disease," will be of value for reference by students. Ticks and other Acarina are appropriately included in the tables, as well as true insects. Mr. MacGregor warns the reader that his lists "can in no way claim to be complete," but the omission of the sheep-flies (*Lucilia sericata*, etc.) from "the chief insects and Acarina that are directly the cause of disease in man and his domestic animals" is somewhat surprising.

In a recently issued pamphlet, "Zur Auffassung der Verwandtschafts-Verhältnisse der Tiere, I," Prof. J. E. V. Boas, of Copenhagen, speculates on the relations of the Echinoderms. He suggests that they were derived, through the Crinoids, from a sessile polyp, and he adduces in support of his view many interesting resemblances of structure. Sedgwick showed how all animals with a body-cavity distinct from the gut might have originated from the Cœlentera, and the article "Echinoderma" in the "Encyclopædia Britannica" (1902, 1911) applies this in more detail to the Echinoderms. But the direct and easy transition imagined by Prof. Boas fails to explain the peculiar torsion of Echinoderm structure, or the traces of bilaterality the existence of which he is bold enough to deny. Had he remedied his admitted want of knowledge of some English writings on this subject he might have dealt with these difficulties more convincingly. Prof Boas then proceeds to construct an ancestral worm (an "Ur-Chætopod," to be precise), from which he would derive the Nemertines and flat-worms, the Enteropneusta, the Chætognatha, and the Brachiopoda; and he connects this ancestor with the Echinoderms by way of the Holothurian Synapta. He brings out, it is true, a number of interesting analogies, but most zoologists would ascribe these to similarity in the mode of life. A brief final chapter deals with the germinal layers and the development of the cœlom. The author insists throughout that his hypotheses are possibilities rather than proved theories. If they present difficulties even as possibilities, we may none the less be grateful to Prof. Boas for presenting ancient problems in a new light and in a manner that is both interesting and easy to follow.

In the February issue of the *Scientific Monthly*, published in New York, two interesting articles on meteorology in connection with the war appear. Prof. R. DeC. Ward writes about "Weather Controls over the Fighting in the Italian War Zone," and gives details about the rain- and snow-fall and the temperature during the past three years. The fighting has been chiefly in mountainous regions, and the passes have often been blocked by heavy snow. Prof. Alexander McAdie deals with "Meteorology and the National Welfare." A considerable part of his article is concerned with the prevailing winds, such as the trades and monsoons, and Prof. McAdie points out how the character of a season in the United States depends on the direction of the prevailing wind in that particular season. He shows how aviation will depend upon a knowledge of these winds, and expresses the hope that much information about the currents and temperature of the upper air useful for meteorology will be obtained by aviators after the war. In the same number of the magazine there is also an article on "Snow and its Value to the Farmer" by Dr. Andrew H. Palmer, which is interesting and contains many good reproductions of photographs.

Some experiments carried out at the Cancer Research Department of the Middlesex Hospital are described by Mr. J. C. Mottram and Dr. S. Russ in a paper in the Proceedings of the Royal Society of Medicine, vol. x. The paper gives a detailed record of experimental observations of a case of carcinoma under radium treatment. An ionisation method was employed to determine the intensity of the radiation emitted by the several applicators used, and, in addition, measurements of the absorption of the β and γ radiations by the skin and subcutaneous tissues were made. This was done in order to be able to compare the effect produced upon the skin when it is irradiated in such a manner that equal amounts of β and γ rays are absorbed by it. Details of the observations on the skin and subcutaneous nodules subjected to screened and unscreened β and γ radiations are given. As a result of the tests it is established that, first, if the skin is irradiated in such a manner that the neighbouring portions absorb equal amounts of β- and γ-ray energy, similar reactions are produced, but they are, in general, more pronounced in the case of the γ rays. Secondly, if the skin is exposed to a large amount of β or γ radiation for a short time the reaction is more pronounced than if the same dose is given using a smaller amount of radium for a correspondingly prolonged period. The effect on the malignant subcutaneous nodules was not, however, appreciably different in the two cases.

The *British Journal of Photography* has reprinted in its issues for March 1, 8, and 15 a paper on "Axial Aberration of Lenses," by Messrs. Tillyer and Shultz, of the Bureau of Standards at Washington, which has appeared in the Journal of the bureau. After a clear account of the way in which zonal aberration and the sine condition affect the image, the authors describe a modification of the Hartmann method which they have introduced for the determination of the axial aberration of lenses and instruments. In the case of a lens monochromatic light of wave-length 4250, 4750, 5500, or 6500 Ångström units is allowed to fall on a metal screen seven metres away, perforated with holes a millimetre in diameter and three millimetres apart.

The lens is placed immediately behind the screen, and the thin pencils of light which pass through the holes are received on a photographic plate placed at suitable points between the lens and its focus, and beyond the focus. From the subsequent measurements of the positions of the spots of light on the plate curves showing the variation of the effective focal length, the spherical aberration and the coma for each of the four kinds of light used are drawn. Seventeen sets of curves for typical lenses are reproduced in the paper.

The Institution of Electrical Engineers has issued in pamphlet form the standard clauses for street lighting specifications which are the outcome of the deliberations of the Joint Committee consisting of delegates of the Institution of Electrical Engineers, the Institution of Gas Engineers, the Institution of County and Municipal Engineers, and the Illuminating Engineering Society, and appointed in 1910. The specification prescribes the form of tender, particulars of lighting units, and the general nature of the contract. It is proposed to classify streets in five classes, having respectively a minimum illumination of 0·01, 0·025, 0·04, 0·06, and 0·1 foot-candle, the minimum being measured with a suitable photometer in a horizontal plane 3 ft. 3 in. from the ground. A minority report expresses the dissent of the council of the Institution of Gas Engineers to the proposed basis of measurement, and it is preferred that contracts for street lighting should be based on the average candle-power of the light source ascertained at two or three prescribed angles. The points at issue were dealt with in the discussion of a paper on this subject by Mr. A. P. Trotter before the Illuminating Engineering Society in 1913, but complete agreement was not attained. As the matter has been under consideration for six years it was decided to publish the clauses as they now stand, accompanied by a minority report. It is hoped that they will be found useful when methods of street lighting are reviewed after the war. Copies can be obtained from the secretary of the institution, price 3*d.*, post free 4*d.*

The relation between temperature and the pressure of a saturated vapour is of great theoretical and practical interest, and a very extensive literature already exists on the theoretical side, special attention having been given to the relationship in the case of water and water vapour, and ice and vapour. So far as the vapour pressure of ice is concerned, experimental determinations have been carried out with considerable accuracy in recent years by Scheel and Heuse and others, but there has been a great need for a series of exact determinations of the vapour pressure of ice at low temperatures, in order partly to correct the values obtained by Scheel and Heuse, and partly to see whether the Nernst formula holds good down to the lowest pressures. Such a series of determinations has been carried out with the greatest care by Sophus Weber, working in the laboratory of Prof. Kammerlingh-Onnes at Leyden (Communications from the Physical Laboratory of the University of Leyden, No. 150). The method employed was the ordinary static method in combination with the absolute manometer and the hot-wire manometer of Knudsen. The measurements extend over a range of temperature from about −22° to −190° C., and the values have been compared with the Nernst formula,

$$\log p = \frac{-2611 \cdot 7}{T} + 1 \cdot 75 \log T - 0 \cdot 00210\, T + 6 \cdot 5343.$$

The concordance has been found to be particularly good. By the introduction of a quantum-formula due to Pollitzer, Nernst has made his equation more rational, but so far as agreement with experiment is concerned, there appears to be little to distinguish the two expressions. Incidentally, it may be said, the experiments of Weber show that water vapour at a temperature of −80° has a molecular weight of about 20, whereby partial association is indicated.

The customary methods for the preparation of plant nucleic acids are rather cumbersome and necessitate a peptic digestion of the nucleoproteins extracted. Messrs. G. Clarke and S. B. Schryver have succeeded in avoiding the peptic digestion, and their method of procedure is described in the *Biochemical Journal* for December. In the preparation of nucleic acid from yeast, the latter, after pressing, is treated with a large excess of 95 per cent. alcohol for twenty-four hours, and then boiled for two hours in the same solvent, whereby the protein-complex is rendered insoluble in sodium chloride solution. The yeast is then filtered, pressed, dried at 37°, ground to a fine powder, and extracted for four to five days with 10 per cent. sodium chloride solution at 60°–80°. When the clear extract is treated with hydrochloric acid a characteristic precipitate of nucleic acid separates and settles to a hard cake at the bottom of the vessel. After standing, this is washed with 50 per cent. alcohol until free from chlorine, left standing overnight in 95 per cent. alcohol, and finally washed with absolute alcohol and ether. The yield varied from 1·4 to 1·6 per cent. of the dry alcohol-extracted yeast. The crude nucleic acid was best purified by dissolution in warm 10 per cent. sodium acetate solution, and reprecipitation with hydrochloric acid. Nucleic acid can be prepared from wheat embryos in a similar manner, but in this case it is found advantageous to remove the starch by hydrolysis with takadiastase before extracting with sodium chloride solution.

OUR ASTRONOMICAL COLUMN.

Infra-red Solar Spectrum.—By the use of plates stained with dicyanin, Mr. W. F. Meggers, of the Washington Bureau of Standards, has obtained an excellent series of photographs of the solar spectrum in the region from 6800 A to 9600 A (*Astrophysical Journal*, vol. xlvii., p. 1). These photographs thus provide material for accurate determinations of wave-lengths in continuation of the classic tables of Rowland, which did not extend further than the approximate limit of the visible spectrum at 7300 A. Photographs in the same part of the spectrum of more than forty of the chemical elements have also been taken, and nearly 400 of the solar lines have been identified with lines in the spectra of eighteen elements. Two hundred lines are accounted for by iron, sixty-three by nickel, twenty-seven by titanium, twenty-two by cobalt, and smaller numbers by chromium, silicon, manganese, calcium, and other elements. One thousand six hundred lines remain for the present unidentified. In addition to the well-known bands due to terrestrial oxygen, there are others which appear to be due to water vapour. The separation of the solar and telluric lines has been undertaken at the Allegheny Observatory by the solar rotation method. Publication of the wave-lengths is postponed, but reproductions of the solar photographs, with wave-length scales, are included in the paper.

Harvard College Observatory.—A recent report of the committee appointed to visit and report upon the Harvard College Observatory refers chiefly to the valuable services rendered by the director in promoting co-operation among astronomers. It is now about forty years since Prof. Pickering began to advocate the advantages of united efforts in carrying out some of the larger investigations in astronomy, and at the present time a considerable amount of the work of the